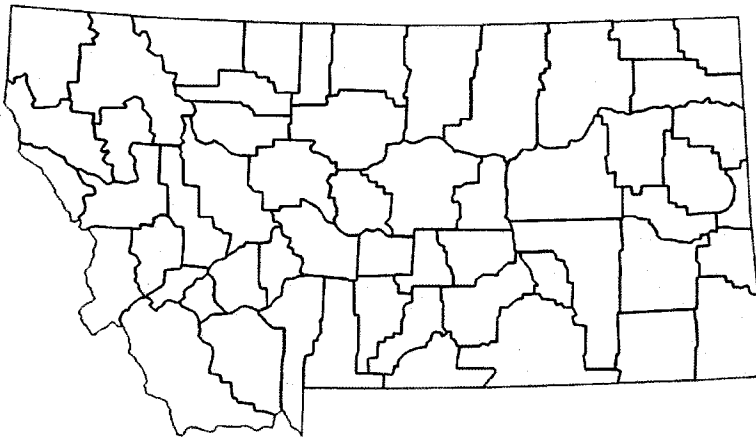


An Analysis of Montana Home Sales 2003 - 2008



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Executive Summary

An analysis of MT Department of Revenue data on home sales shows that the number of sales peaked in 2006 and has been declining since then. After adjusting for the differences in the types of homes which sold in each year, the average value of Montana homes sold grew in each year by a statistically-significant amount. In 2008 this annual growth rate is estimated at 2-3%.

For most individual counties, price changes from year to year were not large enough to show a statistically-significant change. Depending upon the method used, six or seven counties showed significantly higher prices in 2008 than 2007. In a few cases, county-level prices may have peaked in 2006 or 2007 relative to 2008: In the case of Flathead County, prices most probably peaked in 2007.

The number of homes sold in Montana grew between 2003 and 2006, then began to fall. Using the available data, I estimate that the best-case scenario is that 8,500 homes will be sold in Montana in 2008. This will represent a drop of 30% from 2007 and over 50% from 2006 sales levels.

Introduction

This report is the result of a request by Montana Revenue Director Dan Bucks that I (Scott Rickard) evaluate the Montana Department of Revenue (MDOR) property tax database of residential real estate transaction to determine if home prices, based upon homes sold in the state, peaked in 2007. This question was important because, by the requirements of the Montana Constitution and statute, MDOR is scheduled to conduct a reappraisal of all homes based upon the characteristics of home sales in 2008.

The data provided to me was handled at all times to maintain confidentiality. The data provided did not include information about the buyer or seller, only characteristics of the property and the transaction. I signed strict confidentiality agreements with the MDOR to not disclose personally-identifiable information from this data. I did not directly access MDOR databases: Their analysts extracted this data from their databases and transmitted to me only the needed data element via a secure FTP link. While in my possession, this data resided on a dedicated secure server administered by the MSU-Billings Information Technologies department. I could only access it from the computer in my locked office, which is password protected. I modified my operating system and application parameters to store all permanent, temporary or working files on the secure server.

I received this sales data in several iterations, between May and November, as it became available. The data included all observations from January 1st, 2003 forward. Given the delay in receiving sales records from the counties, I consider the data complete through June 2008 and partial from then through late November of that year. In the summer of 2008 and again in October-November I analyzed this data using a variety of statistical techniques. This report details important parts of this analysis.

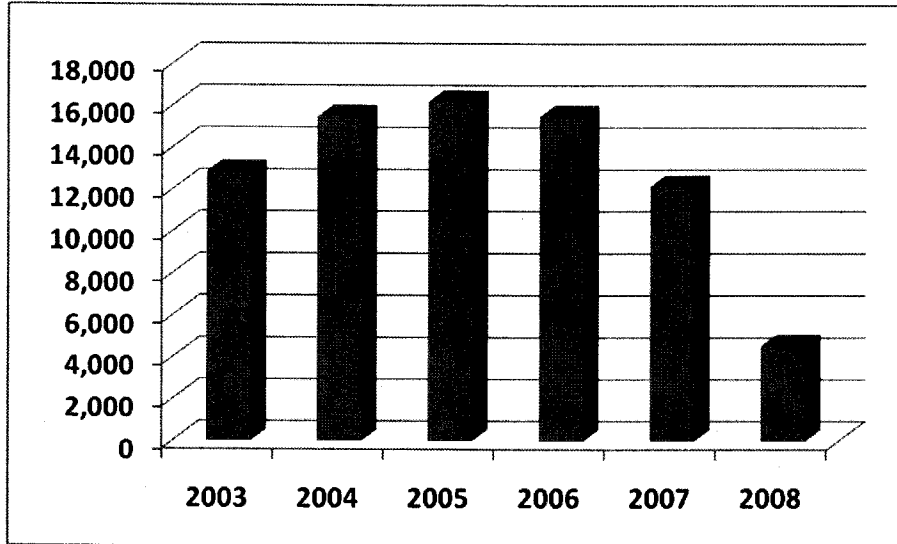
The report is structured as follows. After a description of how home sales statewide progressed from January 2003 and June 2008, I present the models that I used to disentangle the characteristics of 2003-2008 home sales. I then discuss the results of these models, including my forecast of what sales levels can be expected for the rest of 2008. I conclude with a summary of results. A data appendix contains relevant data tables and model results.

I want to thank the MDOR staff that made this project possible. This list included Director Dan Bucks, MDOR Administrator Randy Wilke, and MDOR Management Analyst Randy Kaiser. They offered their complete assistance and in no way tried to influence the results of this analysis. Any errors found in this analysis or report is my fault, not theirs.

Montana Home Sales Characteristics

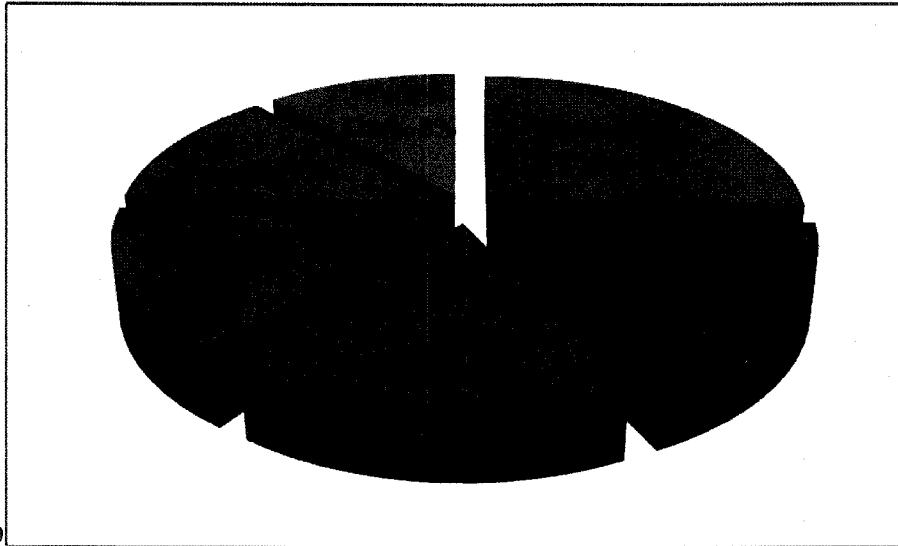
The number of homes sold in Montana between 2003 and 2008 rose, then fell. Appendix A contains tables detailing home sales per year by county in Montana between 2003 and 2008.

Figure 1. Total Sales per Year



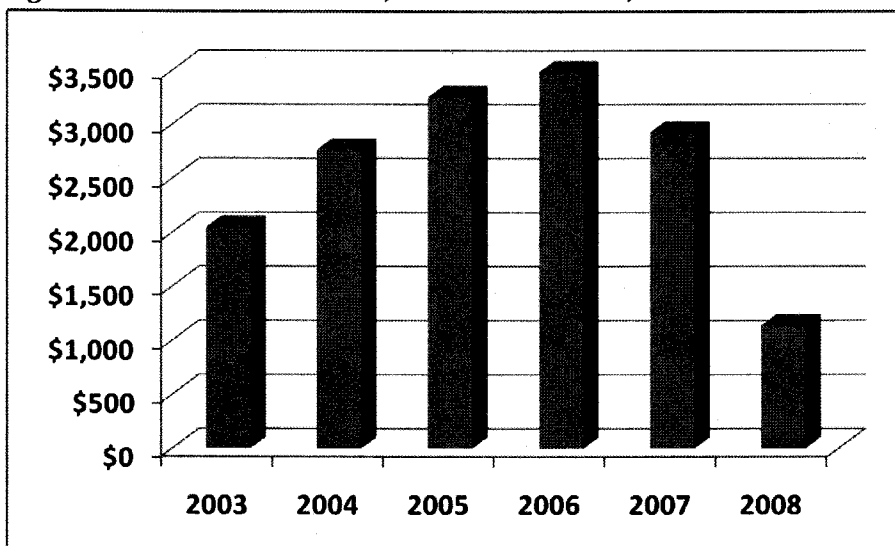
As shown in Figure 1, over 76,600 home sales occurred between January 1st, 2003 and 2008 Year-to-Date (YTD). 2005 was the peak year for sales, with 16,179 transactions taking place, but this was only slightly higher than the 2004 and 2006 sales levels of 15,462 and 15,462 respectively. In calendar 2007, sales dropped by over 20%. The available 2008 YTD data shows 4,549 home purchases.

Figure 2. Average Percentage of State Sales, 2003-2008



The majority of home sales take place in just a few counties (see Figure 2). On average, two-thirds of the homes sold were located in Yellowstone, Flathead, Missoula, Gallatin, Cascade, or Lewis & Clark counties. With the exception of Flathead, this follows the pattern of most-populated counties having highest sales levels. Many other counties have relatively few sales in a given year. When combined, the total sales from 32 counties represent only six percent of the state total for the state. 2008 YTD performance is even more striking, with 12 counties reporting zero transactions so far.

Figure 3. Total Sales Volume, 2003 – 2008 YTD, in millions.

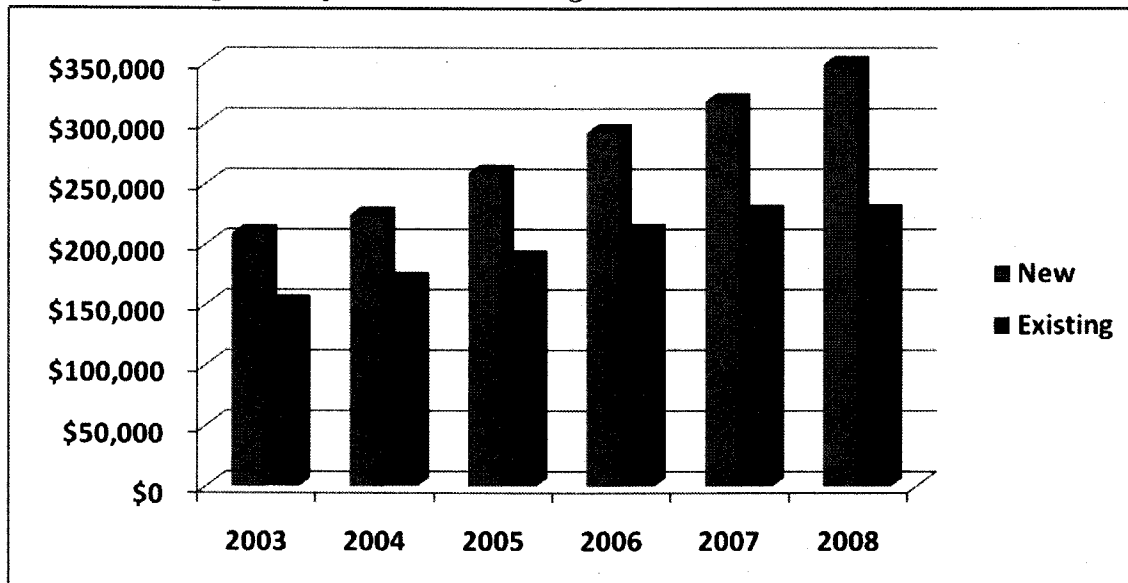


Total sales volume in Montana was over \$14 billion over 2003-2007 and averaged \$2.9 billion per year. The six counties with the largest number of transactions were also the counties with the largest volume of sales revenues, and eight counties represent over 80% of the total dollars spent in home purchases. Flathead County had the highest total sales, totaling nearly \$2.6 billion between 2003 and 2007. The sixteen counties at the bottom of the sales distribution had combined sales of under \$53 million, which would not rank in into the top 20 for the state if these counties were treated as one.

Table 1. Mean and Median Price for New and Existing Homes

| Year | Mean Price | | Median Price | |
|------|---------------|---------------|---------------|---------------|
| | New | Existing | New | Existing |
| 2003 | \$ 208,963.69 | \$ 151,109.04 | \$ 164,900.00 | \$ 130,000.00 |
| 2004 | \$ 224,500.10 | \$ 169,987.53 | \$ 177,500.00 | \$ 142,000.00 |
| 2005 | \$ 259,297.04 | \$ 188,223.67 | \$ 197,000.00 | \$ 157,000.00 |
| 2006 | \$ 292,797.36 | \$ 209,972.41 | \$ 223,800.00 | \$ 170,000.00 |
| 2007 | \$ 318,384.94 | \$ 225,787.36 | \$ 229,000.00 | \$ 180,000.00 |
| 2008 | \$ 349,070.80 | \$ 226,255.43 | \$ 239,000.00 | \$ 188,747.00 |

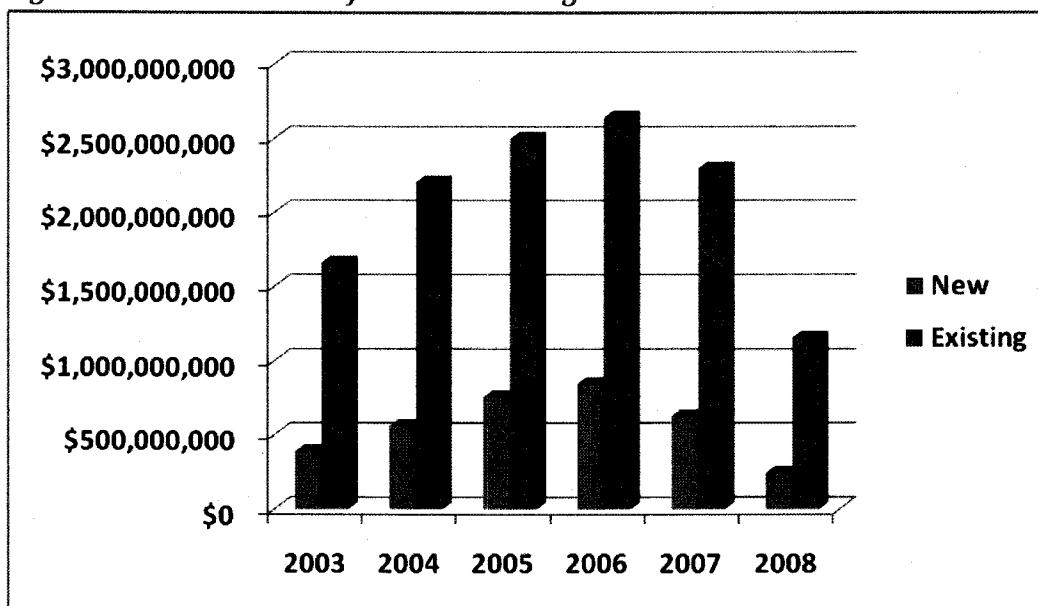
Figure 4. Average Price for New vs. Existing Homes.



While the available data did not let me specifically identify newly-built, previously unoccupied homes, I was able to identify homes that were sold less than two years after they were built. Treating these transactions as New Home Sales, Figure 4 and Table 1 shows that statewide the price of these new homes averaged 30-50% higher than the average price of existing homes in the same year. This difference was statistically-significant in all years¹. The average price of existing homes rose from \$151,109 in 2003 to \$226,255 in 2008 YTD, while the average price of

new homes rose from \$208,964 in 2003 to \$349,071 in 2008 YTD. To reduce the influence of the small number of very expensive homes, you can compare median prices, which is the point where one-half of the homes sold for less and one-half sold for more (see Table 1). In each year, the median price of new homes was 25%-30% higher than that of existing homes sold.

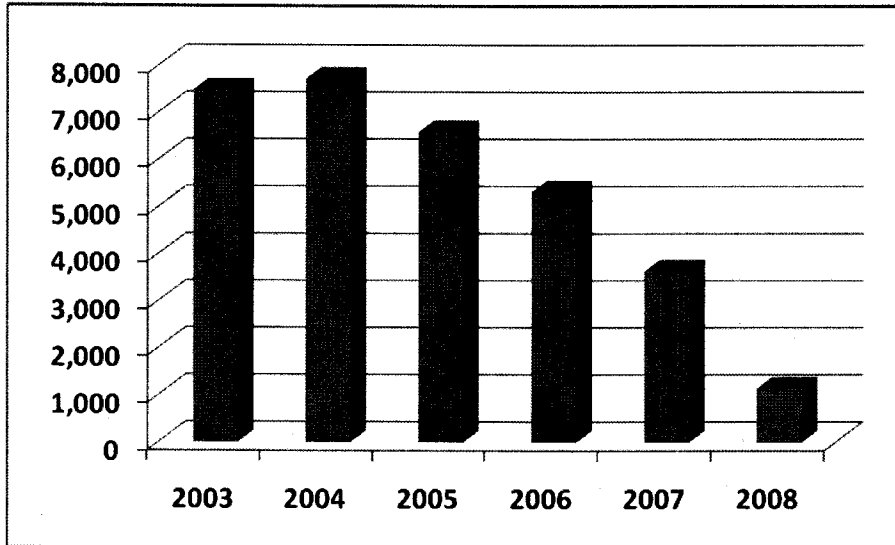
Figure 5. Dollar Volume of New vs. Existing Home Sales



The total value of the sale of newly-built homes represented 19-24% of the total value of all homes sold in each full year, reaching a peak of \$846 million in 2006 (see Figure 5). This statistic should not be confused with the economic impact of a home sale. New home sales represent an infusion of money into a community, while the sale of existing homes is for the most part an asset transfer. Assuming that at a net 7% commission rate, all of the dollars from new home sales at least once pass through the community in which it was built, while only the commission rate flows into a community when an existing home changes hands, meaning that new home sales represents 75-80% of the total dollars which directly flow into a community from residential real estate transactions.

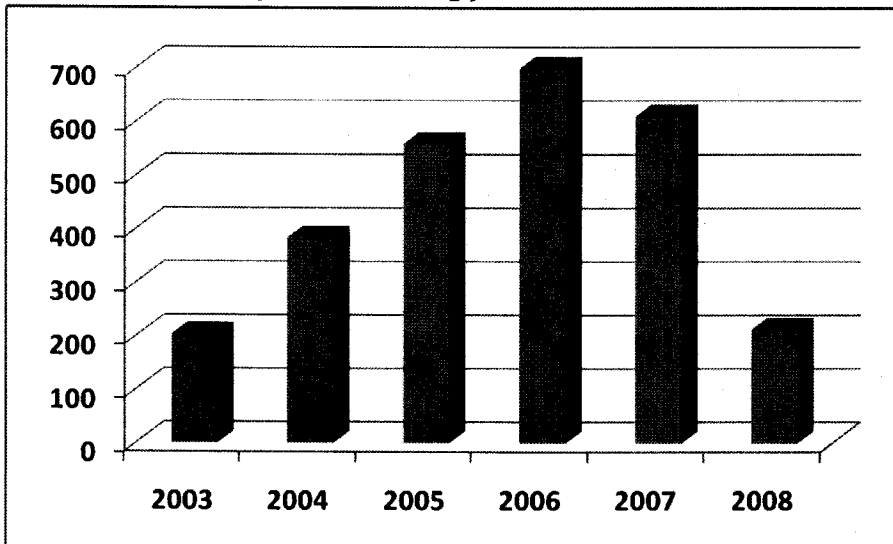
Since I only had complete data through June, 2008, I examined the Jan-June sales characteristics to see how early-year buying compares to sales later in the year. The percentage of sales in the first half of the year grew by 1% per year in 2003-2005, then by 3-4% in 2006 and 2007. This was probably due to the slowing of sales which started in second-half 2006. The total value of first-half sales each year was proportional to yearly totals, suggesting that homes sold in the first half of the year are not, on average, more or less expensive than homes sold in July – December.

Figure 6. Number of Homes Selling for Less Than \$150,000



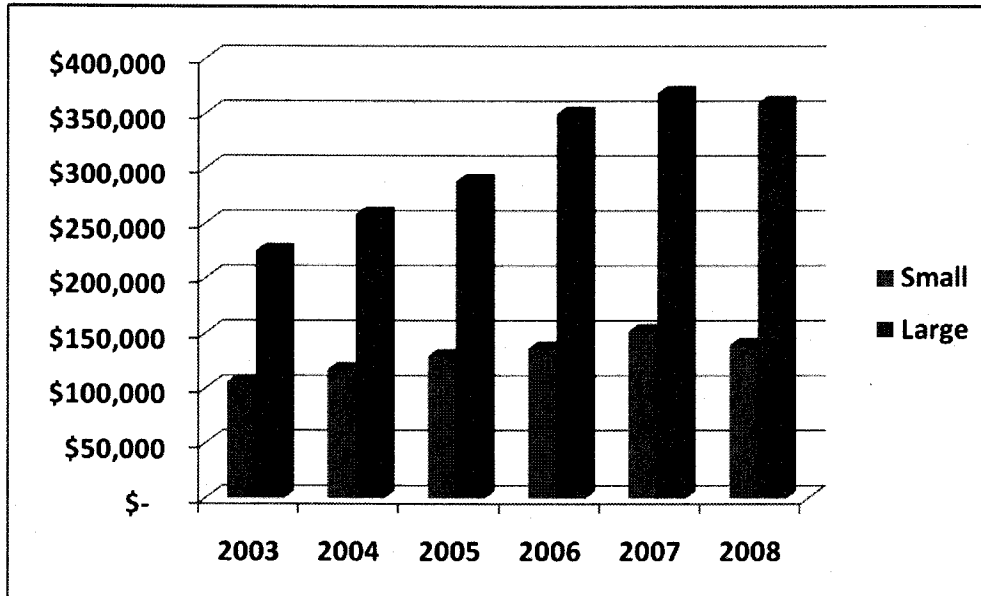
As shown in Figure 6, in 2003 and 2004 around 7,500 homes, representing 57% and 50% of total sales respectively, sold for less than \$150,000. By 2007 this number dropped by one-half to 3,600. Both in 2007 and 2008 sales of these homes represent less than 30% of the total. Some of this decline can be expected given the overall increase in home prices during this periodⁱⁱ.

Figure 7. Number of Homes Selling for More Than \$500,000



Sales of \$500,000 or higher homes grew as a percentage of total sales (see Figure 7.). In 2003, less than 2% of homes sold cost over \$500,000. By 2007 these home represented 5% of all transactions, and in 2008 YTD the fraction remains above 4%. One factor contributing to this increase is the overall increase in MT housing prices (all homes have become more expensive).

Figure 8. Average Sale Price for Small vs. Large Homes



Another way to examine the inexpensive and expensive parts of the housing market is to look at specific home sizes. Figure 8 shows the average price of homes with 2 bedrooms and 1 bath (labeled 'Small') and the average prices of homes with 4 or more bedrooms and 2 or more baths ('Large'). As shows on this graph, the prices of these modest homes have grown by 44% between 2003 and 2007, from \$106 thousand to \$152 thousand, and have declined 9% in 2008 YTD. Similarly, the average prices of large homes grew by 64% in 2003-2007, from \$225 thousand to \$369 thousand, then fell slightly to \$360 thousand in 2008 YTD.

(As will be shown later in this report, the 2008 price declines in these two market segments may be due to the characteristics of the homes sold in that year.)

Condominium sales are also worth noting. There were over 1,400 condominium sales recorded between 2003 and 2008. These sales occurred in only eight counties, and the vast majority of sales were in Flathead (28%), Gallatin (27%), Madison (16%) or Missoula (12%) counties.

County-Level Average Prices

In order to analyze county-level average prices from year to year, I compared the mean of the log-transformed sale price because of statistical problems (heavy skewing, non-normality) with the underlying dataⁱⁱⁱ.

Table 2. Parametric Analysis of Log-Transformed Price-Levels

| County Name | Price 05<06 | Price 06 < 07 | Price 07 < 08 |
|----------------------|----------------|------------------|------------------|
| Broadwater County | | X | |
| Carbon County | X | | |
| Cascade County | X | X | |
| Dawson County | X | | |
| Deer Lodge County | X | | |
| Fergus County | | | X |
| Flathead County | X | X | O |
| Gallatin County | X | O | |
| Hill County | | | |
| Jefferson County | | X | |
| Lake County | X | X | |
| Lewis & Clark County | X | X | |
| Liberty County | | X | |
| Lincoln County | X | X | |
| Madison County | X | | X |
| Missoula County | X | X | |
| Park County | X | | |
| Phillips County | | X | |
| Ravalli County | X | | |
| Roosevelt County | X | | |
| Rosebud County | | X | |
| Sanders County | X | X | |
| Silver Bow County | | | X |
| Toole County | X | | |
| Yellowstone County | X | X | X |

As shown in Table 2, 2006 average prices were statistically significantly higher than 2005 prices in 17 of the counties. Comparing 2006 to 2007 prices, I found 13 counties where 2007 prices were greater than 2006, and one case (Gallatin County) where prices fell significantly in 2007 relative to 2006. With the available 2008 data, I found four counties where 2008 prices could be shown to be significantly above 2007 averages and one county (Flathead) where YTD 2008 prices were significantly lower than 2007 averages. In other counties, the difference in prices were too small for these statistical tests to indentify a significant difference.

Table 3. Non-Parametric Analysis of Prices

| County Name | Price 05>06 | Price 07 > 06 | Price 08 > 07 |
|----------------------|----------------|------------------|------------------|
| Carbon County | X | | |
| Cascade County | X | X | |
| Deer Lodge County | X | | |
| Flathead County | X | | O |
| Gallatin County | X | O | |
| Hill County | X | | X |
| Jefferson County | X | X | |
| Lake County | | X | X |
| Lewis & Clark County | X | X | |
| Lincoln County | X | X | |
| Madison County | X | | X |
| Missoula County | X | X | |
| Park County | X | | |
| Phillips County | X | | |
| Ravalli County | X | | X |
| Silver Bow County | | | X |
| Yellowstone County | X | X | |

As an alternative to log-transformed estimates of significant price changes, I also evaluated the data using nonparametric statistics. Nonparametric methods make fewer demands upon the data, but are not as powerful as their parametric counterparts.

Using the Kologoromov-Smirnov test of difference in means, I find statistically-significant evidence that prices in 15 of 19 counties tested grew between 2005 and 2006, and grew again between 2006 and 2007 in 8 of 19 (see Table 3). With the available 2008 data, five counties experienced significant price increases between 2007 and 2008 YTD.

And as with the parametric tests, this analysis also found that Gallatin County prices dropped between 2006 and 2007, and Flathead county average prices fell between 2007 and 2008 YTD.

A State-Level Model of Home Sale Prices

The previous discussion shows that there are a number of factors which influenced average sale price. To control for some of these factors, I used a hedonic model approach. This model assumes that homes differ in their characteristics; buyers differ in how much they would value the bundle of characteristics which each house contains, and that changing a house's characteristic may change what it is worth.

A full-blown hedonic model analysis is typically a two-stage approach and calls for a number of assumptions concerning the data and the behavior of buyers and sellers. In this analysis I used

a single-equation model which avoids some of the potential problems and still produces reasonable results for research questions such as those asked in this project.

This model assumes that the natural log of the price of a home can be predicted by its attributes such as size, age, location, and condition. The solution to a log-linear hedonic model contains estimates of the percentage change in the value of a home if that characteristic is available.

I used sets of dummy variables for housing style characteristics, location (county), and time (year sold). I structured the model to treat the YEAR variables as fixed effects because I was only interested in examining the changes in average price across the calendar years available in the DOR dataset. I am assuming that in each sale year there were outside (international, national and state-wide) forces that influenced the sale price of all MT homes sold in that year. I modeled the location variable COUNTY as a random effect, meaning that I believe that average price of the homes sold in each county are driven, in part, by conditions unique to that county location, and that prices vary less within a county than they do between different counties.

I designed the model to be capable of identifying the following:

- If the average sale price of a home sold in MT changed significantly between calendar years,
- If the average sale price of homes sold in a particular MT county was significantly different from the average sale price of homes sold in other MT counties in a given year,

The final model specification was as follows:

$$\ln(\text{SalePrice}) = \beta_1 + \beta_2 SF + \beta_3 AGE + \beta_{4...9} [STYLE] \\ + \beta_{10} CDU + \beta_{11} RESGRD + \beta_{12} POP + \beta_{13...38} [COUNTY] + \beta_{39...45} [YEAR] + \varepsilon$$

Table 2 describes these variables.

Table 4. Description of Model Variables

| Variable | Description |
|-------------------|--|
| Sale Price | Sale price of property |
| SF | Square footage of improved living space in the housing unit |
| AGE | Actual or effective age of the housing unit |
| [STYLE] | Dummy variables for housing styles condo, bi-level, split-level, ranch, log, and conventional homes. |
| CDU | CDU rating given by appraiser. Converted to a 10-scale number |
| RESGRD | Residential Grade rating given by appraiser. Converted to a 10-scale number |
| [COUNTY] | Dummy variables for each county |
| [YEAR] | Dummy variables for sale in years 2003 through 2008. |

At first, a number of additional variables were hypothesized to be important and were included in the model. These variables included additional housing characteristics such as the number of bedrooms or a greater selection of the home styles. These variables were not included in the final model because they were not statistically significant and/or introduced modeling problems such as multicollinearity which reduces the predictive power of the model results.

The methodology I used to analyze this model was a variation of Analysis of Variance (ANOVA). This type of analysis requires three things: Independent observations, normally-distributed residuals from group means, and equal variance of these residuals across groups. This first assumption implies that the homes which sold each year are representative of all homes which could sell. This is a strong assumption, but typical of transaction-based housing research. I tested the second and third assumptions on the analysis variables, both on the individual analysis variables and by specifying the model to compute estimates based upon unequal variances (using the Satterthwaite correction for degrees of freedom and specifying fixed effects as 'Repeated' in PROC MIXED). The results of these tests suggested that ANOVA was an appropriate technique for this data.

All statistical analysis was conducted using the statistical analysis software SAS Version 9.1.4.

Model Results

An example of full model results is shown in the Appendix. The parameter estimates for the full model are shown in Table 4. For the overall model of statewide sales over all year, the results can be interpreted as follows:

Table 4. Estimated Price Change Relative to 2008 Price Levels

| | Change Relative to 2008 Prices | Example of Estimated Sale Price |
|------|---|---------------------------------------|
| 2003 | -41% | \$147,650 |
| 2004 | -32% | \$170,650 |
| 2005 | -22% | \$194,725 |
| 2006 | -12% | \$220,525 |
| 2007 | -3.6% | \$241,025 |
| 2008 | | \$250,000 |

Sales Year

Average sale prices increased by a statistically-significant amount each year. Controlling for the variables in this model, the average home sold in 2008 had a sale price 3.6% higher than what it would have sold for in 2007. Similarly, the average home sold in 2008 had a sale price 12% higher what it would have sold for in 2006. Between 2003 and 2008 YTD, the average price of a home increased, and this increase is statistically-significant. Table 4 shows the percentage change in price each year relative to 2008 prices and, as an example, what a home selling for \$250,000 in 2008 would have sold for in previous years.

Square Footage

Larger homes sold for more money. Measured in improved space, the average size of homes sold grew from 1,442 square feet in 2003 to 1,480 in 2005-2006, before falling again to 1440 in 2007 and 2008 YTD. With a parameter estimate of 0.000252 (.0252%), a 40-square-foot increase in living area would increase the sale price by 1%. Put another way, for the average house sold in 2008, each additional square foot in improved living space would add \$60.73 to the sale price.

Age

Older homes sold for less money. The database included both a date built and an estimate of effective age, which was an appraiser-based estimate. The age variable is the difference between the year sold and either the year built or effective age, whichever was more recent. The age variable measures the potential lifespan remaining in the structure. The maximum age of a building in the database was listed as 99 years.

The average home sold in 2008 had an effective age of 21.3 years. For each additional year older, the price of this house drops by 0.32% or \$771.

Condition, Desirability, and Usability (CDU)

Neighborhoods and location mattered. CDU is a rating score given by appraisers. It is a letter grade, from PR for poor to EX for excellent. For analysis purposes I converted this grade to a numeric index, with 1 representing unlivable and on up to 9.

The average linearized CDU score in 2008 was 5.7. An improvement of a full point increases average sale price by 18.2% or \$43,856.

Residential Grade

Higher quality homes were more expensive. Residential Grade is an index of quality and workmanship of the home given by an appraiser. It is a one-to-nine score with pluses and negatives for 'half-grades'. I recoded this variable, expanding the range and preserving the order of, for example, a rating of 5+ being lower than a rating of 6- while removing the pluses and minuses. The average score was 14.3 (average), and the effect of an improvement of a one level (from an Average to an Average Plus) was worth 6.9% or \$16,627.

Home Style Dummy Variables

The database listed a number of home styles, and several of these were significant predictors of sale price. Relative to the home styles not included in the model:

- A bi-level homes sold for 23.8% or \$57,350 more,
- A split-level home sold for 21.98% or \$52,965 more,
- A ranch-style home sold for 16.5% or \$39,760 more,
- A conventional-style home sold for 14.6% or \$35,181 more, and
- A log-style home sold for 34.5% or \$83,134 more.

County Effects

The county a home is located in was an important determinant of sale price. Relative to other counties, being in the following counties had the following effects (see Table 5):

Table 5. Estimated County-Level Effects in Sale Price

| County | Est. Sale Price Difference | County | Est. Sale Price Difference |
|--------------------------|----------------------------|---------------------|----------------------------|
| Madison | 80% Above Average | Teton | No Difference |
| Lake | 65% Above Average | Silver Bow | No Difference |
| Gallatin | 64% Above Average | Custer | No Difference |
| Flathead | 63% Above Average | Musselshell | No Difference |
| Missoula | 60% Above Average | Toole | -14% Below Average |
| Ravalli | 60% Above Average | Chouteau | -14% Below Average |
| Park | 60% Above Average | Wheatland | -15% Below Average |
| Carbon | 53% Above Average | Glacier | -17% Below Average |
| Mineral | 47% Above Average | Dawson | -18% Below Average |
| Stillwater | 47% Above Average | Hill | -19% Below Average |
| Jefferson | 42% Above Average | Pondera | -20% Below Average |
| Broadwater | 40% Above Average | Fallon | -21% Below Average |
| Lewis & Clark | 40% Above Average | Treasure | -30% Below Average |
| Lincoln | 39% Above Average | Judith Basin | -31% Below Average |
| Yellowstone | 35% Above Average | Powder River | -36% Below Average |
| Sanders | 33% Above Average | Liberty | -42% Below Average |
| Granite | 30% Above Average | Phillips | -44% Below Average |
| Sweet Grass | 30% Above Average | Blaine | -44% Below Average |
| Beaverhead | 19% Above Average | Roosevelt | -46% Below Average |
| Cascade | 16% Above Average | Garfield | -50% Below Average |
| Deer Lodge | No Difference | Prairie | -55% Below Average |
| Richland | No Difference | Carter | -55% Below Average |
| Meagher | No Difference | McCone | -56% Below Average |
| Rosebud | No Difference | Sheridan | -58% Below Average |
| Powell | No Difference | Valley | -59% Below Average |
| Golden Valley | No Difference | Wibaux | -60% Below Average |
| Fergus | No Difference | Daniels | -63% Below Average |
| Big Horn | No Difference | Petroleum | -76% Below Average |

This table shows the estimated average percentage difference in sales price for homes sold in each county. For example, controlling for the other variables included in the model, an 'average' home sold in Yellowstone County would bring 35% more than this same home would if located in a comparable neighborhood in Silver Bow county.

Following this analysis of all available data, I constructed models to evaluate subsets of the full database which I thought could provide additional insight into the MT market. For example, since the available data does not cover all of 2008, I evaluated the performance of homes sold early in each year to see if in this way more of the 2008 home price effects could be analyzed.

Table 6. Summary of State-Level Model Results

| Data Evaluated | Statistically-Significant Results | Discussion |
|---|---|--|
| All Homes Sold | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results.) |
| All Homes Sold Between Jan-June in Each Year | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results.) |
| Sales of 2 Bedroom, 1 Bath Homes | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results and text for discussion.) Differs from simple statistics. |
| Sales of 4+ Bedroom, 2+Bath Homes | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results and text for discussion.) Differs from simple statistics. |
| Homes Less Than 2 Years Old | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results.) |
| Homes 2 or More Years Old | Ave. Home Prices Increased Each Year Between 2003-2008. | (See Appendix for results.) |

As shown in Table 6, these variations produced similar results. In each, the relevant statistical tests found that sales price was predicted to some degree by the explanatory variables^{iv}. Modeling county-specific price differences was important. The path of sale prices in some counties was systematically different than the path of prices in other counties. In every modeling scenario the variable Year Sold was significant and had the correct sign. Also, the parameter estimate was smaller (more negative) the further it was in the past. *These results show that average Montana home prices grew by a statistically significant amount each year between 2003 and 2008, and that average prices in YTD 2008 are statistically higher than in previous years.* This result holds for all of these cases:

- All home sales
- Sales occurring between January and June of each year
- Sales of 2 bedroom, 1 bath homes
- Sales of 4+ bedroom, 2+ bath homes
- Sales of homes less than two years old
- Sales of homes two or more years old.

You can see the importance of this model-based approach by comparing the results for small and large homes. Average sale price for the homes sold in these categories dropped in 2008

compared to 2007. But the model-based approach shows that, controlling for several important housing characteristics, home values in each segment grew in 2008. Taken together, the likely explanation is that different types of the small and large homes sold in 2008 compared to previous years (i.e. older homes in less expensive counties), and that these differences drove sale prices, not a decline in the underlying value of all small or large homes.

County-Level Model Results

For those counties with sufficient sales in each year, I used a modified version of the model to analyze county-specific sale-price behavior. The purpose of this model was to identify, where possible, county-level performance which differed significantly from the state-level analysis.

Table 7. Counties Where 2008 Prices Were Significantly Different than 2006 Prices

| County Name | All Homes | Sales Jan-Aug | New Homes | Existing Homes | Small Homes | Large Homes |
|----------------------|-----------|---------------|-----------|----------------|-------------|-------------|
| Silver Bow County | X | X | X | X | X | |
| Cascade County | X | X | x | X | X | X |
| Yellowstone County | X | X | X | X | x | |
| Missoula County | X | X | X | X | X | X |
| Lewis & Clark County | X | X | x | X | X | X |
| Gallatin County | X | X | X | | | |
| Flathead County | | x | X | | x | |
| Fergus County | X | X | | X | X | |
| Carbon County | X | X | | X | X | |
| Ravalli County | X | X | X | | x | |
| Lake County | X | X | | X | | |
| Dawson County | X | X | | X | | X |
| Beaverhead County | X | X | x | X | | |
| Madison County | | | | | | O |
| Deer Lodge County | | | | | | |
| Stillwater County | X | X | | X | X | X |
| Park County | X | X | X | X | X | |
| Jefferson County | | | | | | |
| Lincoln County | X | X | X | X | | |

X=2006 Prices < 2008 Prices (95% confidence)

x = 2006 Prices < 2008 Prices (90% confidence)

O=2006 Prices >2008 Prices (95% confidence)

As shown on Table 7, the model-adjusted average price in 2008 was significantly higher than average prices in 2006 in 15 of the counties modeled. (In this step, only those counties with at least five sales recorded in 2008 were analyzed, and only those counties with at least one significant difference were listed in this table.) These counties represent well over one-half of the state's housing stock. Similarly, looking only at sales between the months of January and August, 2008 prices exceeded 2006 prices by a significant amount in 15-16 counties.

In terms of new homes (again, those less than two years old, small homes, and large homes) the results are less conclusive. There is strong evidence (95% confidence) that model-adjusted new home prices in 2008 were significantly higher than 2006 levels, and some evidence (90% confidence) that these prices were higher in another three counties. For small homes (two bedrooms, one full bath), 2008 model-adjusted average prices were significantly higher than 2006 prices in 11 of the 29 counties. For large homes (4 or more bedrooms, two or more baths), five counties show significant price increases for 2008 relative to 2006, and in Madison county, 2006 model-adjusted prices were significantly above 2008 price levels.

Table 8. Counties Where 2008 Prices Were Significantly Different than 2007 Prices

| County Name | All Homes | Sales Jan-Aug | New Homes | Existing Homes | Small Homes | Large Homes |
|---------------------------------|-----------|---------------|-----------|----------------|-------------|-------------|
| Silver Bow County | X | X | X | X | X | |
| Cascade County | | X | | | | X |
| Yellowstone County | X | X | X | X | | x |
| Missoula County | X | X | X | | | x |
| Lewis & Clark County | | | | | | o |
| Gallatin County | X | X | X | x | | |
| Flathead County | O | O | | O | | |
| Fergus County | | | | | | O |
| Carbon County | | X | | | X | |
| Ravalli County | | X | x | | | |
| Lake County | | | | | | |
| Dawson County | X | X | | X | | X |
| Beaverhead County | | | | | | |
| Madison County | | | | | | |
| Deer Lodge County | | | | | | |
| Stillwater County | X | X | | X | | |
| Park County | X | X | X | x | X | |
| Jefferson County | | | | | | |
| Lincoln County | | | x | | | |

X=2007 Prices < 2008 Prices (95% confidence)

x = 2007 Prices < 2008 Prices (90% confidence)

O=2007Prices >2008 Prices (95% confidence)

o=2007Prices >2008 Prices (90% confidence)

Comparisons of model-adjusted 2007 vs. 2008 prices also showed statistically-significant differences in many of the counties tested (see Table 8). Overall, model-adjusted average 2008 prices were significantly higher than 2007 levels in six counties: Silver Bow, Yellowstone, Missoula, Gallatin, Stillwater, and Park. In Flathead county, overall model-adjusted prices paid fell. Comparing January-August sales, ten counties showed significant prices increases, while in this segment Flathead county showed a 2008 price decline. In the county-level models of new,

existing, small, and large home sales, I found fewer counties with significant price differences, and in the large home category, evidence of model-adjusted price peaks in 2007 (Lewis and Clark and Fergus counties).

There are several factors contributing to the inability to find statistically significant price changes in these county-level housing-subset models. The first concerns sample size. Only part of the 2008 sales data is available, and overall 2008 sales levels have declined in most counties relative to 2006 levels. With fewer sales transactions it is more difficult to identify a significant difference of a given magnitude. Second, the more I slice the data, first by county, then by a factor such as age or size, the greater the chance that a particular year's average sales will deviate from long-run averages and in fact trigger a 'false positive'.

Time Series Results

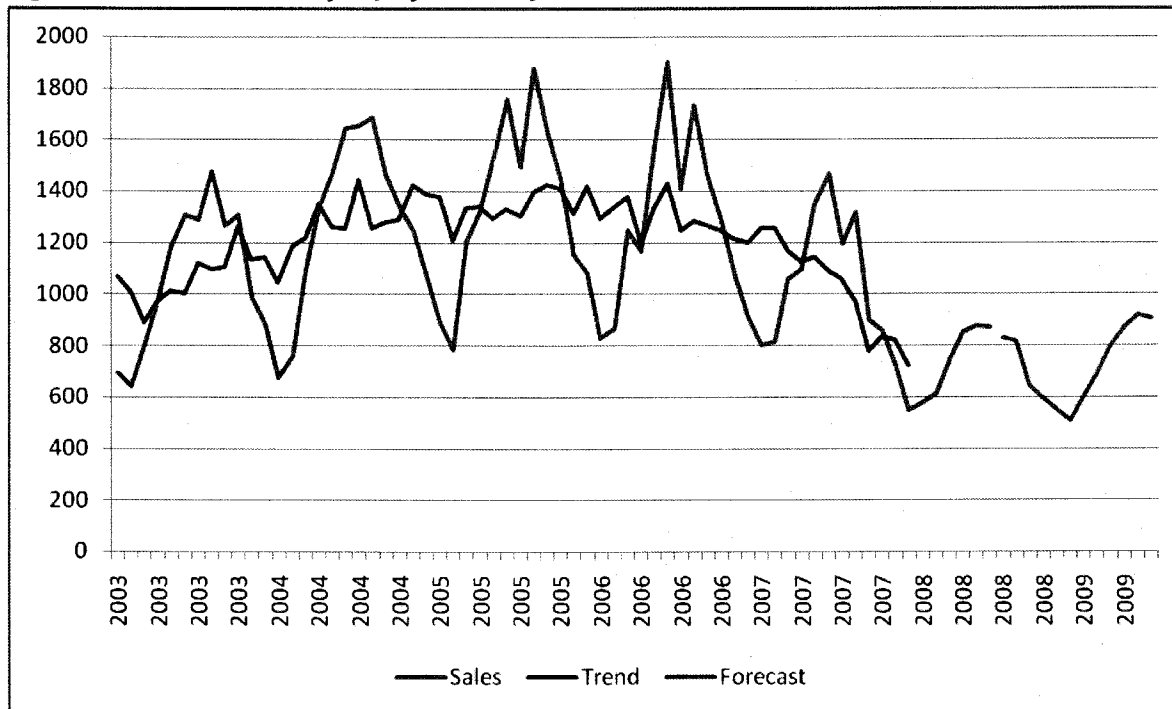
The available data limited the types of time-series analysis possible, but some important relationships are evident^v. There was evidence of 'house flipping' behavior (see Table 9). Ignoring repeat sales within 30 days (which could be the result of contractual issues between builder and buyer) 6.7% of the homes sold in 2005 had been sold at least once earlier in the past two years. This percentage of multiple sales within the three-months-to-one-year time frame grew to around 8.25% of all sales in 2006 and 2007, before falling in 2008 to 6.9% of all sales.

Table 9. Homes Sold Twice or More within Past 12 Months

| Final Sale Year | Sales | Percent of All Sales | Ave. Apprec. |
|-----------------|-------|----------------------|--------------|
| 2005 | 1077 | 6.7% | \$ 33,849 |
| 2006 | 1279 | 8.3% | \$ 43,869 |
| 2007 | 997 | 8.2% | \$ 39,594 |
| 2008 | 398 | 6.9% | \$ 24,939 |

Year-to-year changes in this percentage tracks the housing price changes for these homes. In the years where home prices were rising rapidly, a larger percentage of homes were sold multiple times within the previous two years. This is consistent with what you would expect, with faster price changes increasing the incentive for middlemen to 'flip' properties.

Figure 9. Sales Forecast for July 2008 – June 2009



I also conducted a standard time-series analysis of the sales data and used this information to build a 12-month forecast of home sales. Figure 9 shows the number of sales recorded in the database, by month, from January 2003 through June 2008, along with a trend line and a forecast of future sales. The trend line, based upon a seasonally-adjusted ARIMA analysis of 2003-2007 sales, shows that in 2007 sales levels began to fall. In 2007 this decrease was 20% below 2006 levels. Sales in the first half of 2008 declined relative to 2007, and the best-fitting forecast of calendar year 2008 sales shows a 30% decline in sales relative to 2007 and an over 50% drop from 2006 sales totals^{vi}.

Based upon this forecast (and thus the data available for analysis), I would estimate that approximately 8,500 homes will sell in Montana in 2008 (see Figure 9 and Table 10).

Table 10. 2008 Sales Forecast

| Actual Sales Totals | | | | | | Forecasted Sales Totals | | | | | |
|---------------------|-----|-----|-----|-----|-----|-------------------------|-----|-----|-----|-----|-----|
| JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |
| 581 | 615 | 747 | 855 | 880 | 873 | 830 | 817 | 643 | 590 | 550 | 506 |

I will note that, for several reasons, including further deterioration in credit markets and more recessionary pressures on Montana residents, even this forecast may be optimistic.

Conclusion

My analysis of the DOR housing data produces the following results:

For Montana Overall

- The number of homes sold grew through 2006 and have declined since then.
- Assuming that sellers are not forced to reduce the sale price they will accept, approximately 8,500 homes will be sold statewide in 2008.
- New home sales have declined since 2006. As a percentage of total home sales, the sale of homes less than two years old (used to represent 'new' homes) grew from 14% in 2003 to 19% in 2006 and dropped to 12% in 2008.
- Controlling for differences in home size, age, condition, and location, the average sale price of a home sold in 2008 was higher than if this home were sold in 2007 or earlier years. These results hold for overall home sales, homes sold in the early months of each year, homes less than two years old, homes two-or-more year's old, large homes, and smaller homes.
- Location was important. The same house sold in Madison, Lake, Gallatin, Flathead, Missoula, Ravalli, or Park County would bring 60% or more than if this house were sold in counties such as Deer Lodge or Silver Bow. Conversely, the same house sold in counties such as Wibaux and Daniels would bring 60% less than it would if sold in Silver Bow County.

For Montana's Counties

- With the available data, for most counties I did not find statistically-significant evidence that county-level average home prices differ between 2007 and 2008.
- For the large majority of those counties where the statistical tests produced significant results, it showed that 2008 average prices in these counties were higher than 2007 price levels.
- I could find some evidence that in a few counties 2007 prices may have peaked for the sale of large homes.
- Home prices peaked in Flathead County in 2007.

Endnotes

ⁱ Sale prices are not normally-distributed, with very large skewing and kurtosis coefficients. But nonparametric tests (K-S, Cramer-von Mises) show that distributions of new and existing homes are significantly different. The natural log transformation of Sale Price, which is a monotonic transformation, is much closer to a normal distribution, and parametric tests comparing these means show statistically-significant differences.

ⁱⁱ However, given that average real household incomes in MT did not increase by a similar percentage, this indicates a reduction in affordable homes for purchase by some moderate and all lower income households.

ⁱⁱⁱ Log transformations are both monotonic and can transform heavily skewed data into something closer to a normal distribution. Statistically significant differences between log-transformed prices are equivalent to statistically-significant differences in the underlying average prices. The differences were evaluated using t-tests. I tested for equal variances in each comparison. If the variances were unequal, I used the Cochran and Satterthwaite test statistics. If the variances were equal, I used the pooled t-test statistics. All significance was at the 0.05 level.

^{iv} While this sounds like tepid praise, it isn't. If this criteria is not met, further analysis based upon the model results are meaningless.

^v It would have been best to have had the last two sales of every property, but this wasn't possible.

^{vi} January 2003 through December 2007 monthly sales totals were deseasonalized using the X12 procedure (the Trend line). An ARIMA procedure was used to forecast 2008 sales based upon this trend line. The ARIMA forecast over-predicted Jan-June 2008 monthly sales totals (which I had relative confidence in), and I scaled the estimates down to 61% (the Forecast line), which produced an average percentage of deviation of less than 1% from the actual Jan-June values.